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Climate change impact assessment of extreme precipitation on urban flash floods – case study, Aarhus, Denmark

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Climate change is expected to cause more intense extreme rainfall events, which will have a severe impact on the risk of flash floods in urban areas. An assessment study was performed for the city of Aarhus, Denmark, analysing different methods of statistical downscaling of climate model projections for estimation of changes in extreme rainfall characteristics. Climate model projections from 20 regional climate models (RCM) from the ENSEMBLES data archive were used in the analysis. Two different estimation methods were applied, using, respectively, a direct estimation of the changes in the extreme value statistics of the RCM data, and application of a stochastic weather generator fitted to the changes in rainfall characteristics from the RCM data. The results show a large variability in the projected changes in extreme precipitation between the different RCMs and the two estimation methods considered. Urban flooding in Aarhus was simulated with a model that dynamically couples a hydraulic model of the drainage system and a 2D overland flow model. Scenarios representing current and future climate including uncertainties in the climate projections were analysed using synthetic design storms derived from the estimated intensity-duration-frequency curves.